REMARKS

Favorable reconsideration is respectfully requested in light of the following remarks, wherein Claims 1, 5 and 6 are amended and new Claim 17 is added to the application. Currently, Claims 1-17 are pending in the present application.

Claims 1-3, 6-8 and 14-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,711,090 to *Hartiala et al.* in view of U.S. Patent Publication No. 20002,0179150 to *Balazy et al.* Claim 4 stands rejected under 35 U.S.C. §103(a) as being unpatentable over *Hartiala et al.* in view of *Balazy et al.*, and further in view of U.S. Patent No. 5,121,802 to *Rajala et al.*

Applicants express gratitude for the indication of allowable subject matter. As a result, dependent Claim 5 is written into independent form to include the recitations of Claim 1. Accordingly, it is submitted that Claim 5 is in condition for allowance.

Independent Claim 1 recites a method for controlling rock drilling wherein a percussion device belonging to a rock drill machine delivers impact pulses to rock through a tool and wherein the rock drill machine is simultaneously pushed against the rock by means of a feed actuator the method, comprising feeding a pressure medium to the feed actuator along at least one feed channel; feeding the pressure medium to the percussion device along at least one percussion pressure channel; determining a penetration rate; adjusting at least a percussion pressure on the basis of the penetration rate, conveying at least one pressure medium flow supplied to or from the feed actuator through at least one restrictor, sensing the pressure of the pressure medium before the restrictor and after the restrictor in order to determine the penetration rate, and adjusting the percussion pressure on the basis of the determined penetration rate.

Independent Claim 6 recites a rock drilling arrangement comprising a rock drill machine including a percussion device arranged to generate impact pulses to a tool to be connected to the rock drill machine; a feed beam whereon the rock drill machine has been arranged; a feed actuator enabling the rock drill machine to be moved in the longitudinal direction of the feed beam; a pressure medium system comprising: at least one pressure source; at least one pressure medium channel leading to the percussion device; at least one feed channel connected to the feed actuator; means for adjusting a percussion pressure, and wherein at least one restrictor is connected to at least one feed channel of the feed actuator, the arrangement comprises means for sensing the pressure active in the feed channel before the restrictor and after the restrictor, means for determining the penetration rate on the basis of the sensed pressures before the restrictor and after the restrictor and the pressure medium arrangement is arranged to decrease the percussion pressure when the penetration rate increases.

Independent Claim 14 recites a rock drilling arrangement comprising a rock drill machine including a percussion device arranged to generate impact pulses to a tool to be connected to the rock drill machine; a feed beam whereon the rock drill machine has been arranged; a feed actuator enabling the rock drill machine to be moved in the longitudinal direction of the feed beam; a pressure medium system comprising: at least one pressure source; at least one pressure medium channel leading to the percussion device; at least one feed channel connected to the feed actuator; means for adjusting a percussion pressure, wherein the arrangement comprises at least one adjustment unit for controlling the feed actuator, at least two relief valves arranged in series in load-sense channel of the adjustment unit, at least one restrictor connected to the inlet feeding channel of the feed actuator, the arrangement comprises means for controlling the pressure difference between the inlet

feeding channel of the feed actuator and a reference pressure sensed in-between the mentioned two relief valves in the load-sense circuit of the adjustment unit A of the feed actuator, the reference pressure in-between the two relief-valves is sensed, the pressure after the restrictor is sensed, and the arrangement comprises a control system which is arranged to decrease the percussion pressure when the pressure difference between the above-mentioned sensed pressures decreases.

The Examiner asserts that each of the features of independent Claims 1, 6 and 14 are obvious over *Hartiala et al.* in view of *Balazy et al.* However, for the reasons provided below, Applicants respectfully disagree.

Hartiala et al. discloses a method for controlling feed force in dependence of rotary resistance, column 2, lines 24 and 25. The feed force of the feeder is affected by continuously adjusting the pressure in both pressure ports of the feeder so that, when the rotary resistance increases, the operating pressure of the feeder is decreased in a corresponding degree, column 2 lines 10-23. Thus, *Hartiala et al.* teaches only to affect the pressures of the feed motor.

In addition, *Hartiala et al.* is totally silent about controlling percussion pressure. As is shown in Figures 17 of *Hartiala et al.*, percussion device (6), is presented as a hydraulic circuit controlled independently with respect to the hydraulic circuits of the feed motor (1) and the rotation motor (5).

Moreover, the Examiner equates the throttle valve (19) in *Hartiala et al.* to the claimed restrictor. However, in *Hartiala et al.*, the throttle valve (19) is arranged to a pressure channel (12) of the rotary motor (5), and not to a pressure channel of the feed motor (7). That is because *Hartiala et al.* teaches to monitor the rotation resistance for controlling drilling instead of monitoring the penetration rate, as is the case in the present invention.

The operation of the system of *Hartiala et al* is as follows. When the rotation resistance increases, the fluid flow in the channel (12) of the rotation motor (5) decreases, whereby the pressure loss over the throttle valve (19) arranged in the channel (12) of the rotation motor (5) decreases. This causes lower pressure in a control channel (20) of a control valve (14) of a feed motor (1), whereby the control valve (14) changes position so that return movement of the feed motor (1) is initiated. The control valve (14) is only for controlling the feeding direction. This control procedure has no influence to the percussion device (6).

The Examiner refers to column 3, lines 4 and 5 wherein is only discussed about the pressures supplied to the feed motor (1). Hartiala does not teach controlling percussion pressure on the basis of the penetration rate. The Examiner further refers to column 3, lines 4-5 of *Hartiala et al* and interprets that the sentence "the pressure in the pipe 8 determines the maximum speed of feed force", means penetration rate. However, the speed of the feed force cannot be considered the penetration rate. They are two totally different types of measurements. Moreover, in the pipe of *Hartiala et al.,* there is no restrictor and pressure difference measurement over the restrictor.

Balazy et al. does not make up for the foregoing deficiencies of *Hartiala et al. Balazy et al.* pertains to providing an accurate desired flow rate of process fluids, particularly gases, paragraphs [0003, 0004 and 0008]. A flow control system (10) of *Balazy et al.* includes a flow restrictor (28) mounted in a flow passage (26), as is shown in Figure 1. To control the rate of fluid flow through the system, the pressures upstream and downstream of the flow restrictor (28) are monitored, the pressure difference is determined and the pressure of fluid flowing from pressure regulator (20) is adjusted so that the pressure drop corresponds to the pressure drop required to produce the desired flow, paragraph [0024]. The required pressure drop to produce the desired flow is determined on the basis of the Flow Rate Control Data, as

is shown in Figure 2. Thus, *Balazy et al.* teaches to adjust the pressure drop across the flow restrictor using a pressure regulator, paragraph [0030], or by opening and closing valve (I 20a), paragraph [0031] in order to have the desired flow.

It would be illogical to combine the teachings of *Hartiala et al.* and *Balazy et al.* *Hartiala et al.* teaches to allow the pressure and flow differences across the restrictor because of the varying rotation resistance and it further teaches to utilize this variation in flow for the control of the feeding direction. On the contrary, *Balazy et al.* teaches to adjust the flow in the pressure line accurately in a precise magnitude and teaches to keep it constant. In case the pressure flow in *Hartiala et al.* would be adjusted to be constant as taught in *Balazy et al.*, that would take away the functionality of the control system of *Hartiala et al.*

Further, the combination would still not determine the penetration rate and it would not affect in any way of controlling the impact pressure on the basis of the penetration rate. Accordingly, neither *Hartiala et al.* nor *Balazy et al.*, in combination or alone, disclose the patentable features of independent Claims 1, 6, 14 and 17.

For at least the foregoing reasons, it is submitted that the method and apparatus of independent Claims 1, 5, 6, 14 and 17, and the claims depending therefrom, are patentably distinguishable over the applied documents. Accordingly, withdrawal of the rejections of record and allowance of this application are earnestly solicited.

Should any questions arise in connection with this application, or should the Examiner believe a telephone conference would be helpful in resolving any remaining issues pertaining to this application, it is respectfully requested that the undersigned be contacted at the number indicated below.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this

application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account 50-0573. This paragraph is intended to be a CONSTRUCTIVE PETITION FOR EXTENSION OF TIME in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully Submitted,

Date: June 24, 2008 By: Elaine P. Spector

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